Creating a Learning Organization at NASA

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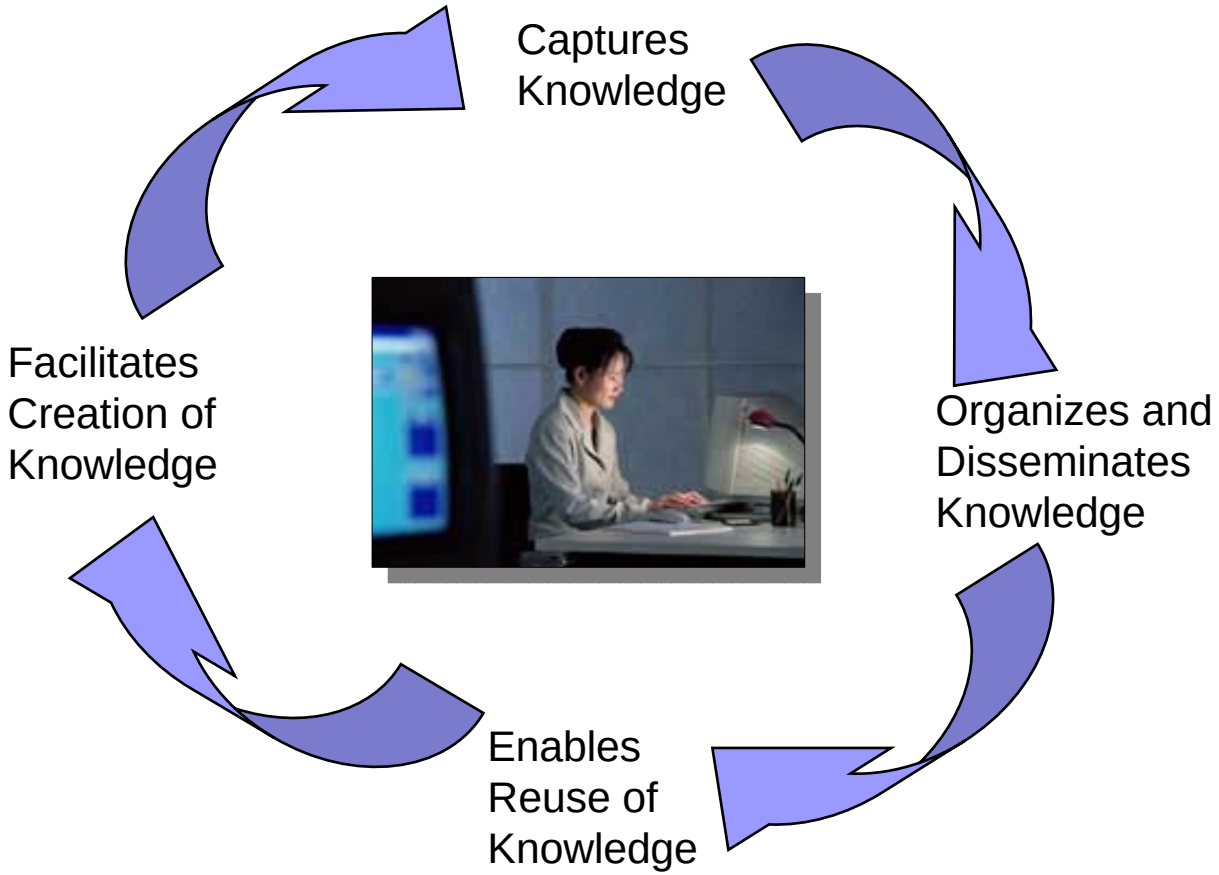
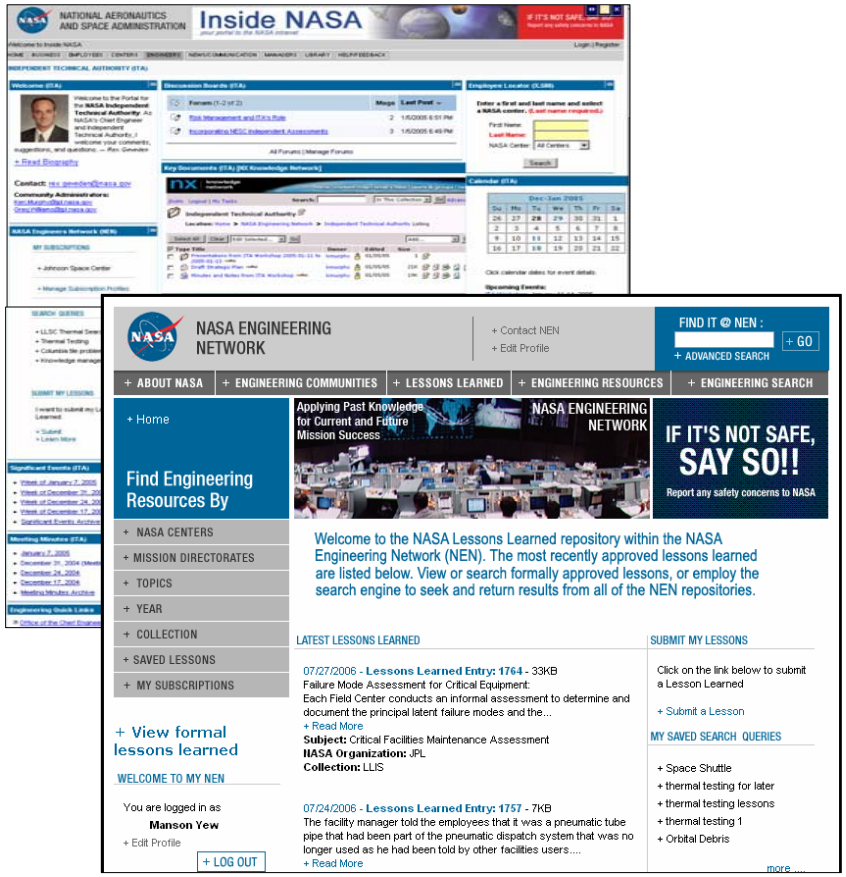
Introduction to the NASA Engineering Network

- Every engineer needs access to all NASA engineering knowledge

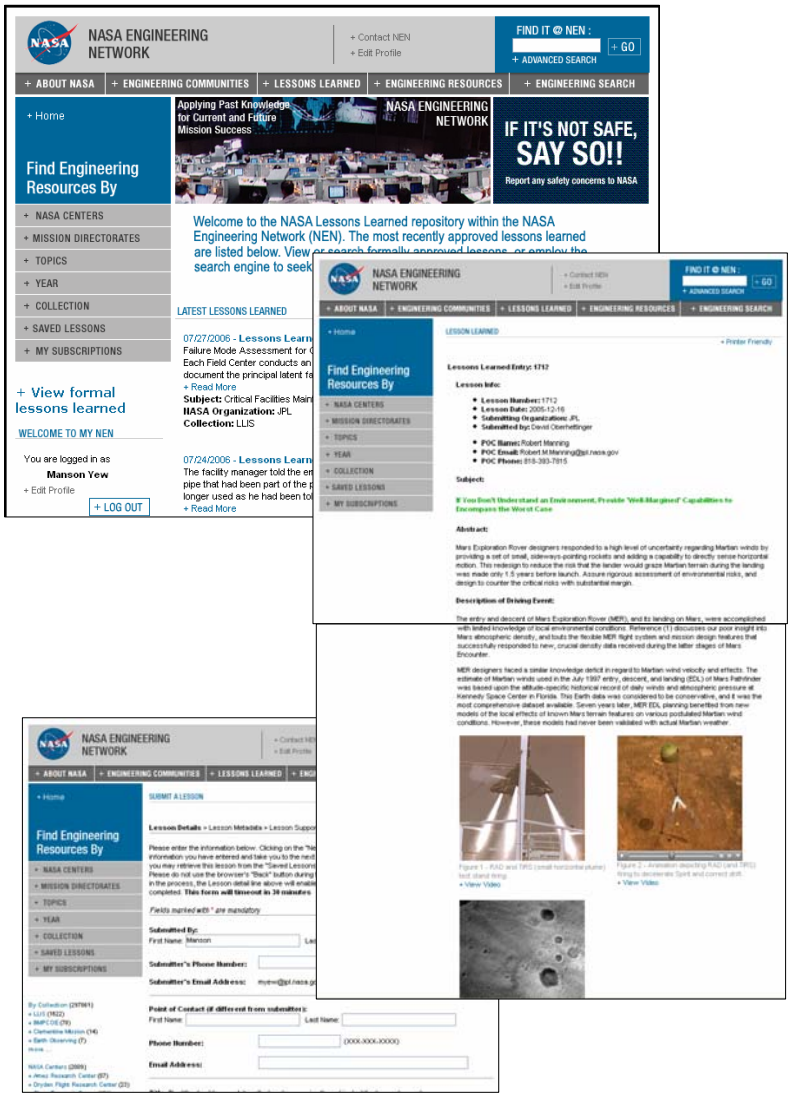


Introduction to the NASA Engineering Network



- The Office of the Chief Engineer created the NASA Engineering Network to be a robust, flexible knowledge management system
  - Networks users to NASA's vast knowledge resources, both documented and tacit
  - Provides a multi-purpose community management tool, task management tool, and lessons learned tool
  - Allows for managing and sharing of discipline standards, requirements and processes with a minimum of labor
- NEN integrates a content management system, portal, search engine, and engineering community management system in support of engineering discipline communities and NASA lessons learned

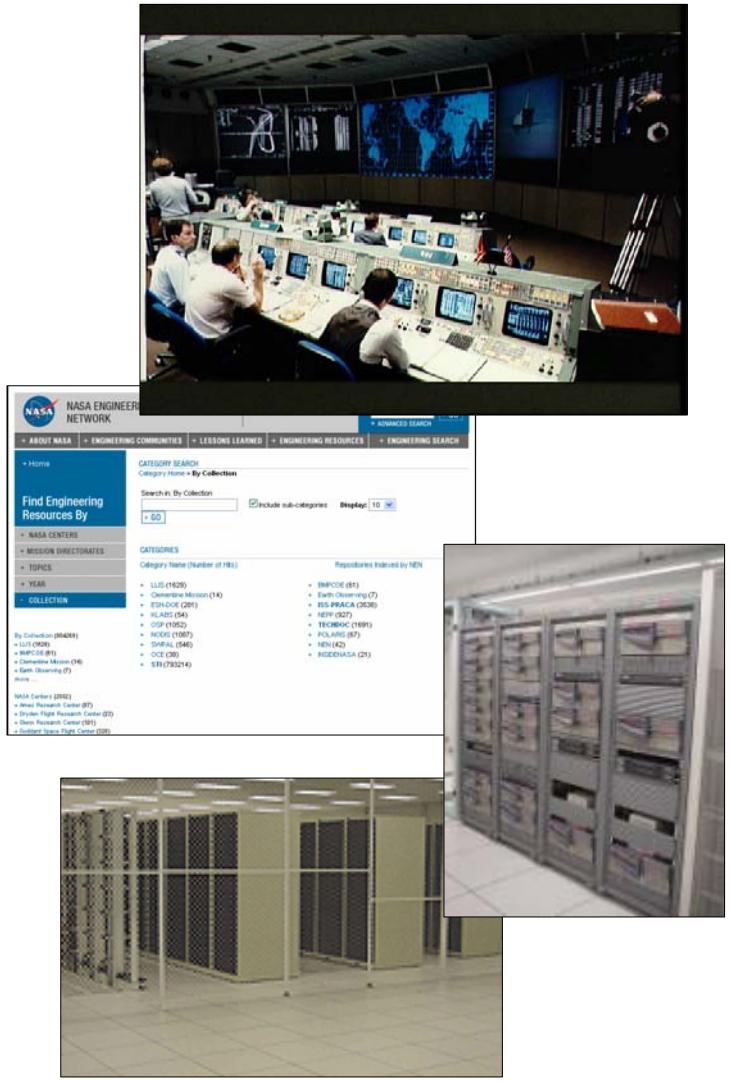
Key Knowledge Resource – NASA Lessons Learned



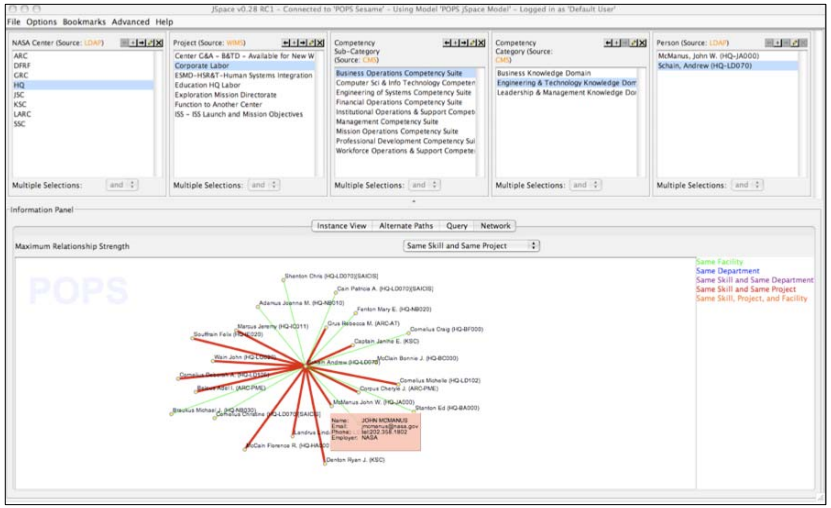
- 1,602 fully vetted Lessons Learned going back to 1972
- Managed by Lessons Learned Steering Committee with representation from all 10 NASA Centers
- Represents NASA's highest validity of reusable knowledge
- But, not a complete body of NASA knowledge

Key Knowledge Resource -- Engineering Databases

- NASA has a wealth of data management systems, problem reporting and corrective action systems, document management systems, and technical report systems
- Extensive set of NASA knowledge
- Validity issues, context issues, seemingly never-ending number of databases



Key Knowledge Resource – Subject Matter Experts



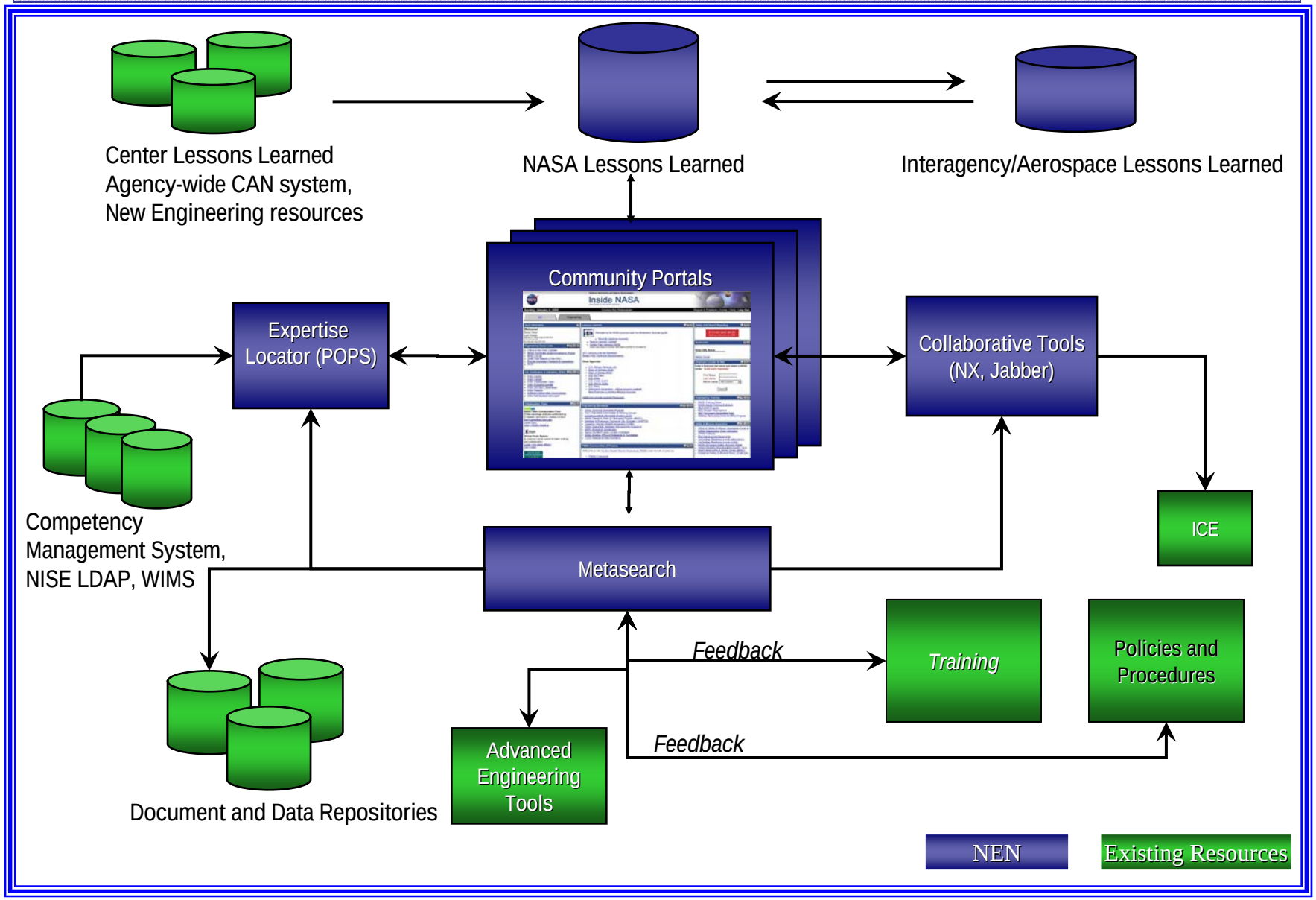
- NASA employs over 46,000 civil servant and contractor engineers representing some of the nation's best and most educated intellectual resources
- Our best knowledge resource
- Not easily discovered, have something better to do than sit around waiting for questions

Industry Benchmarking

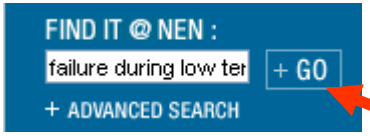
- Formal benchmarking meetings conducted with the following organizations have led to NEN architecture as recognized best practice
- In addition, meta-analysis of published case studies and informal benchmarking also contributed to key architectural decisions and choices

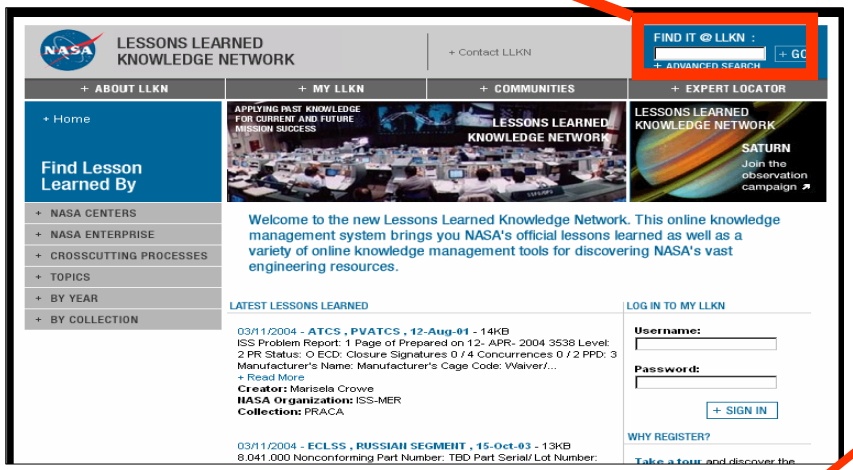
The Aerospace Corporation	Department of Commerce
US Army	Rand Corporation
MITRE	EPRI
Lockheed Martin Space Systems	JHU/Applied Physics Lab
Raytheon	Department of Homeland Security
Nuclear Regulatory Commission	Department of Energy
Intel	Procter and Gamble
Boeing Canoga Park	Rolls Royce Aerospace
Harvard University Learning Innovations Laboratory	Ball Aerospace
Australian Taxation Office	

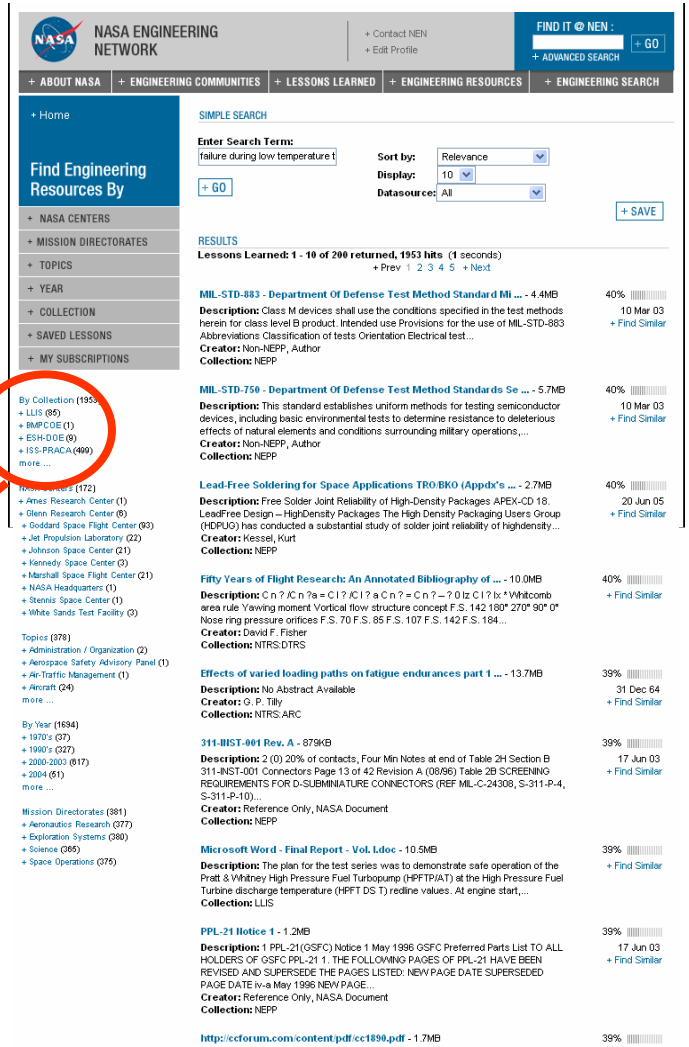
Functional Architecture of NEN



Finding Solutions

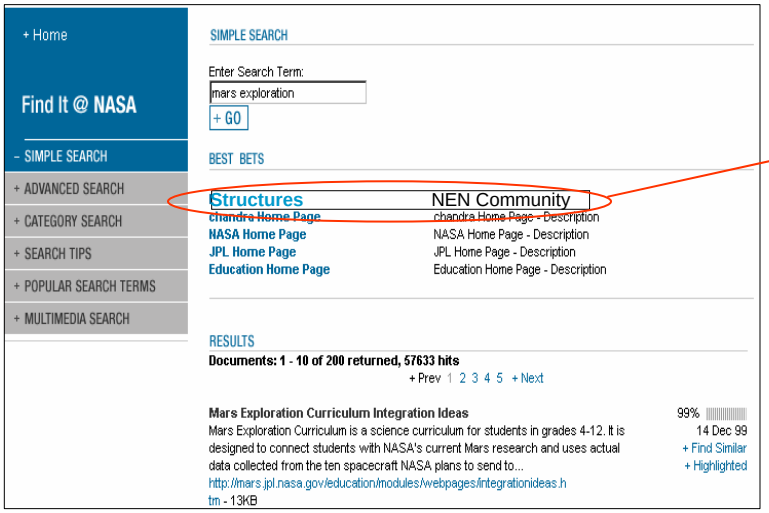


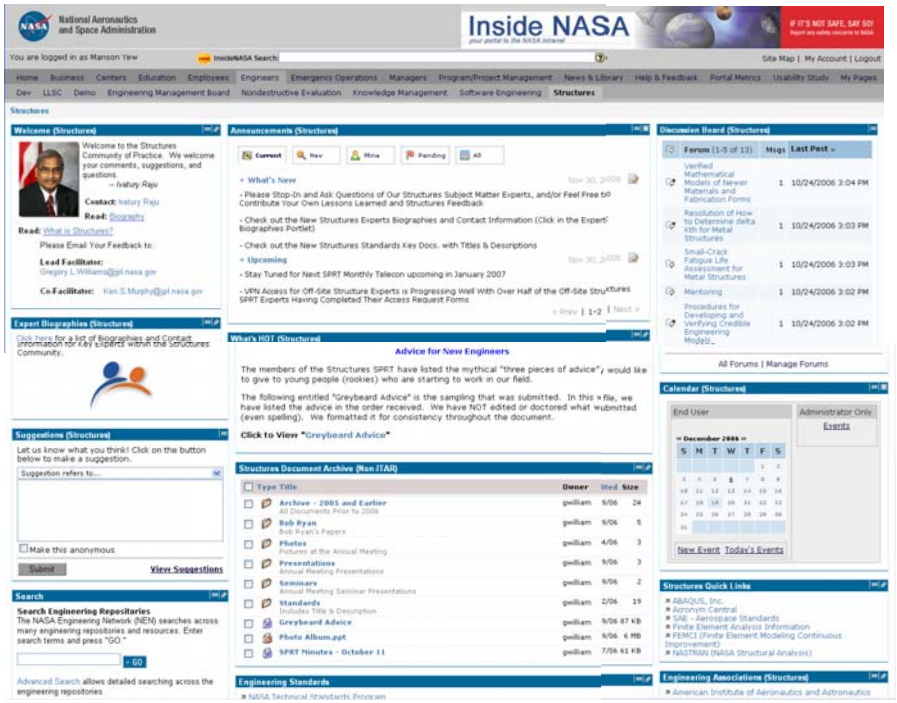




- Search across multiple repositories
- Faceted navigation to drill down into results

Finding Solutions (continued)

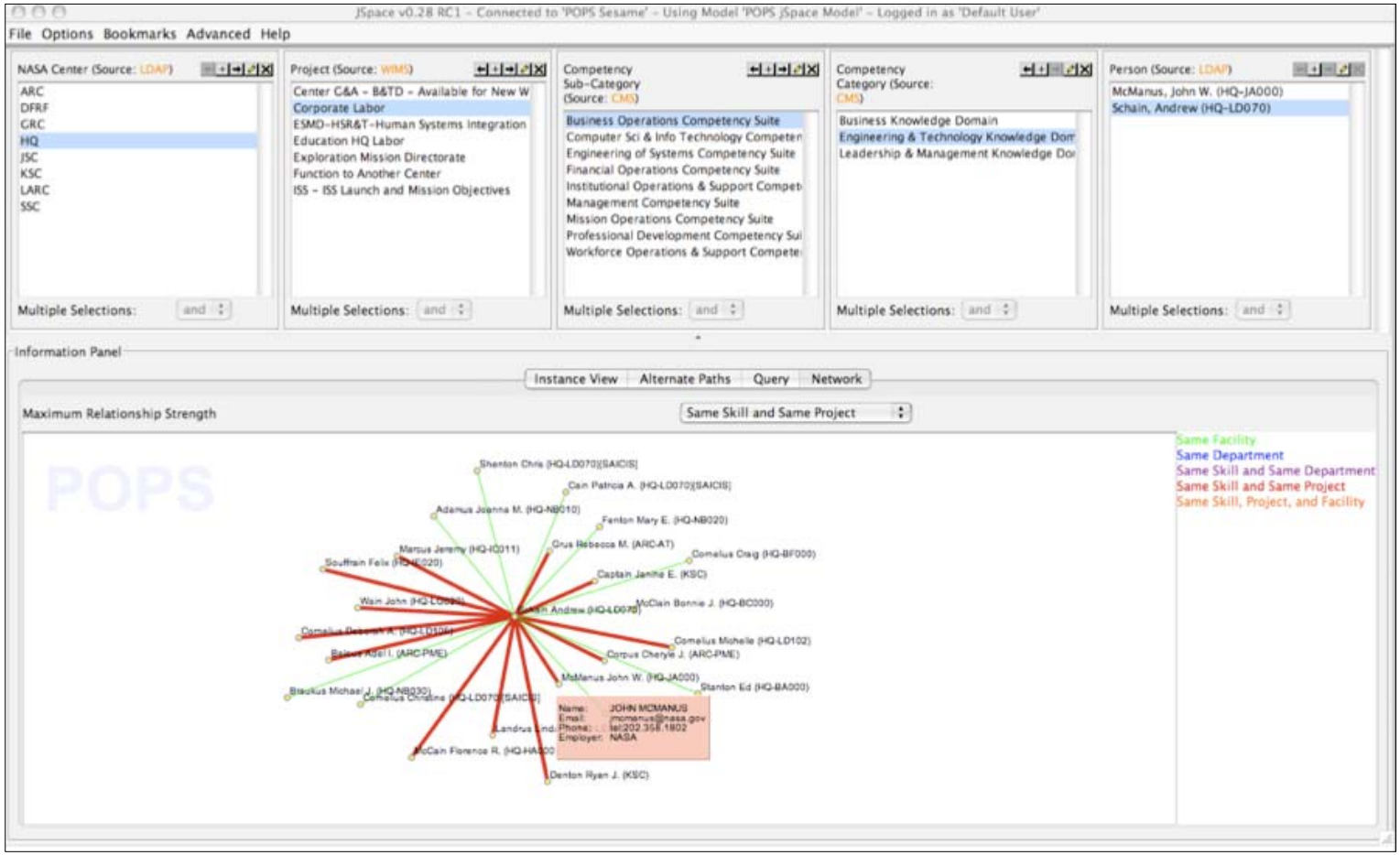




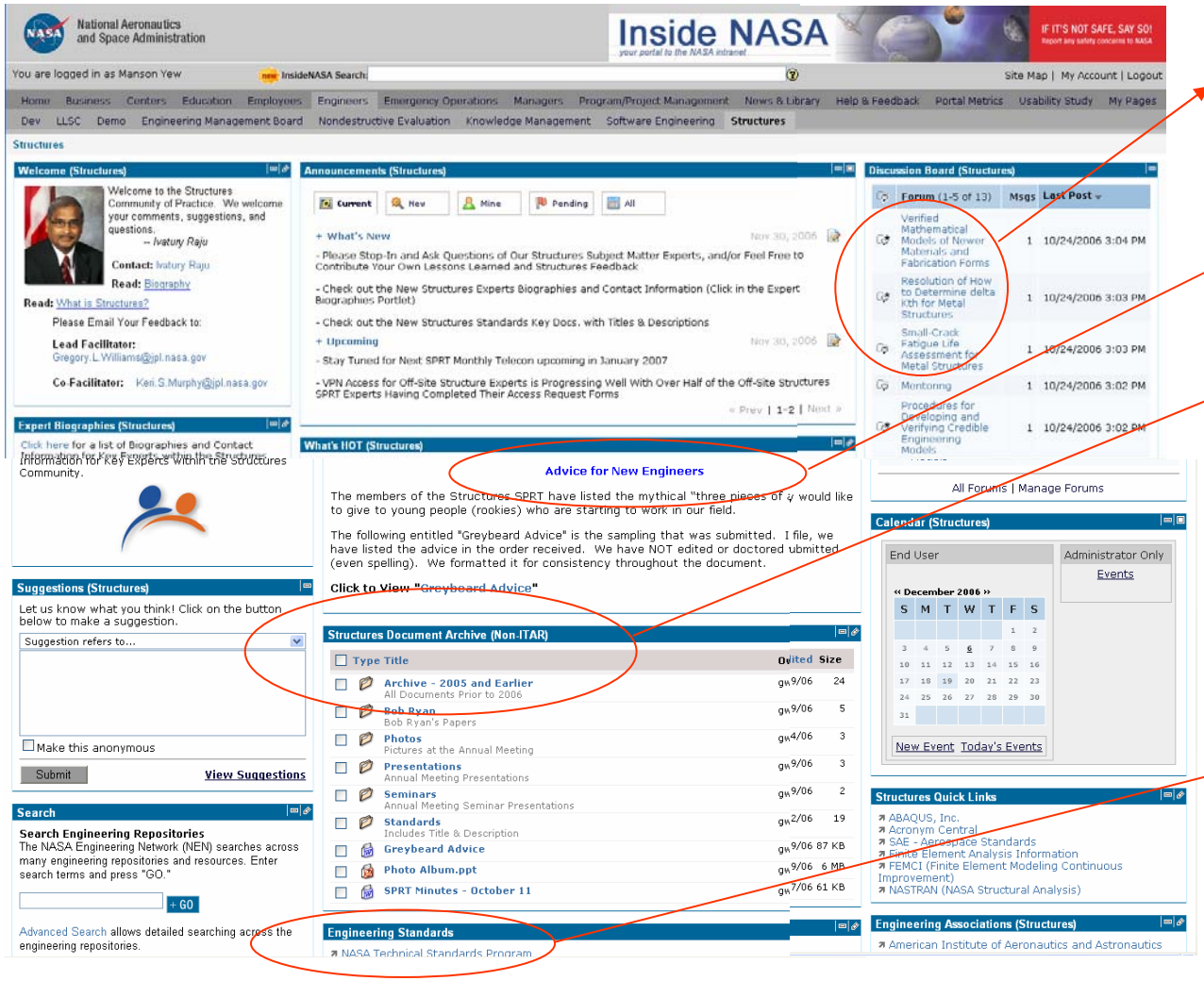
NEN searches may lead to community of expert practitioners

Finding Solutions (continued)

NEN communities provide a variety of expert locator tools



Disseminating Lessons and Best Practices



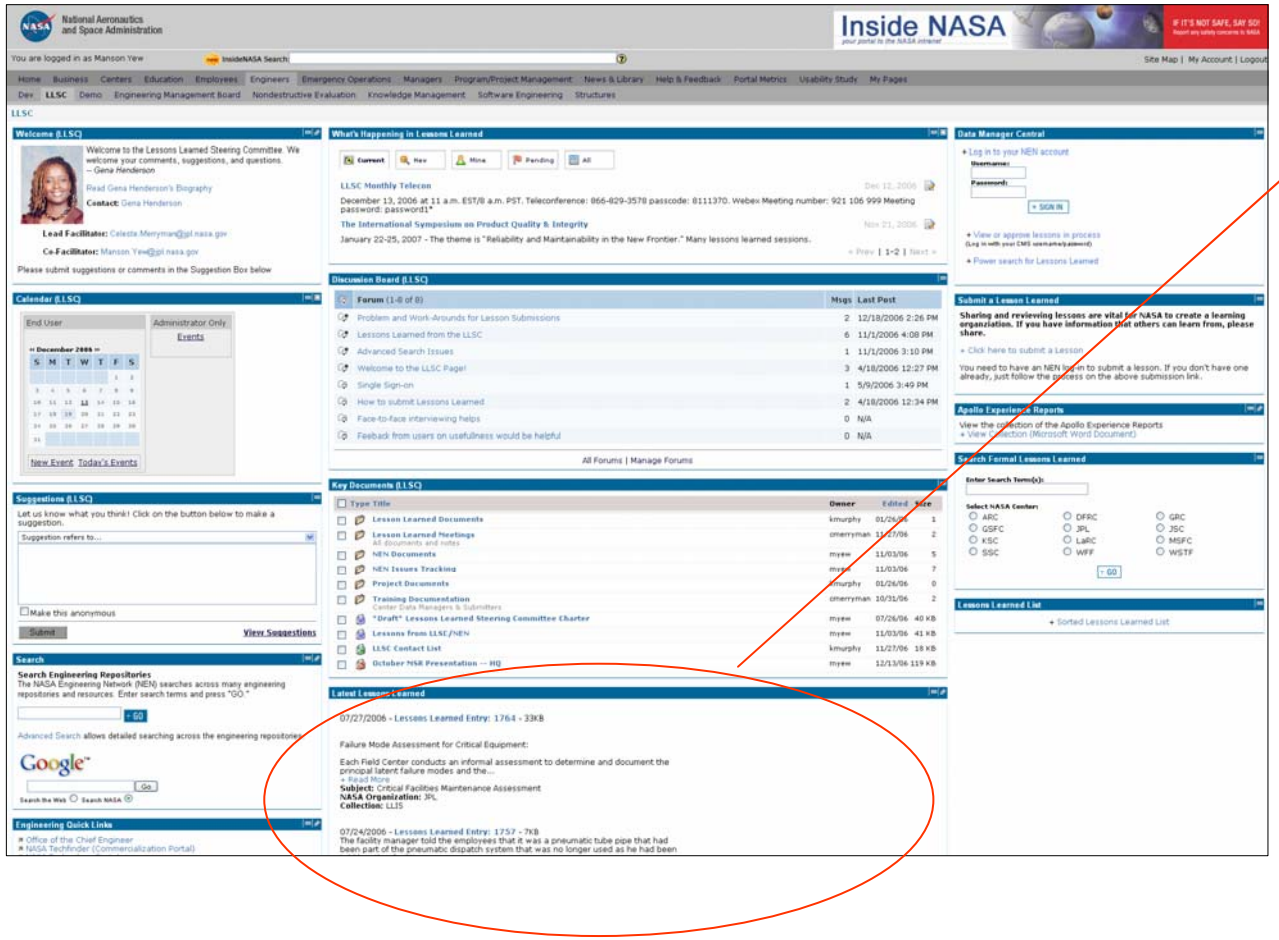
Discussions on key topic areas

Experts' advice

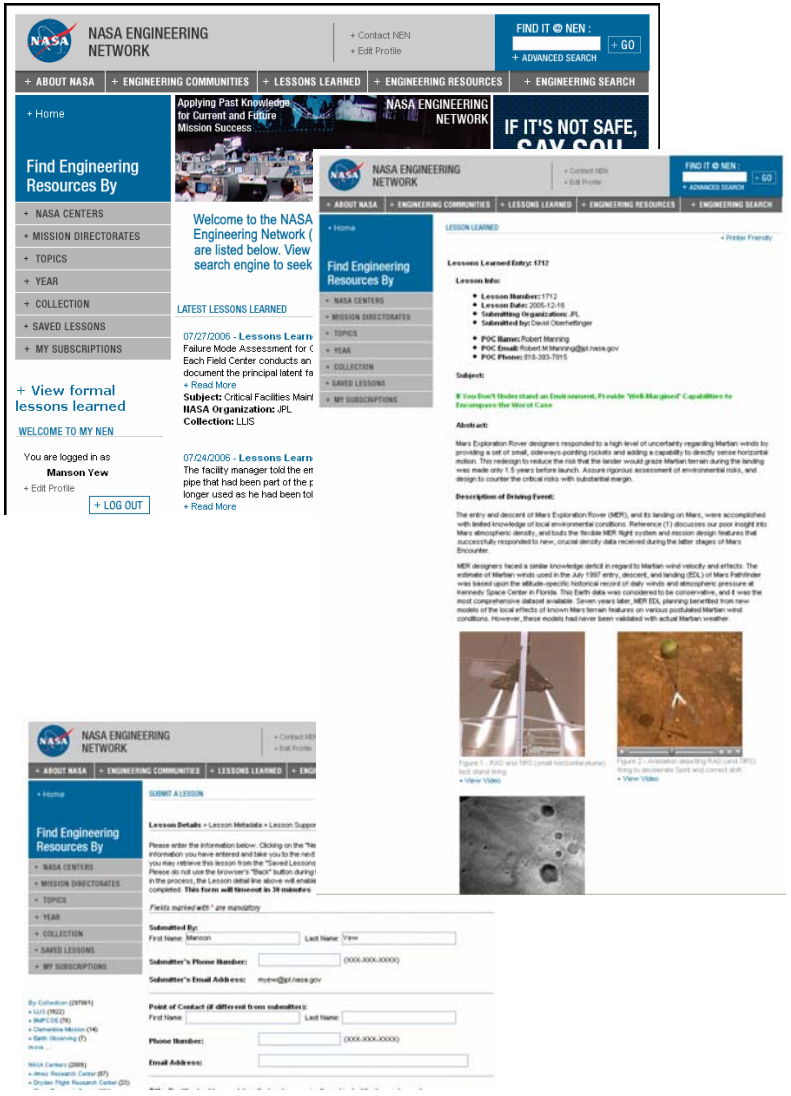
Key community documents

Engineering standards

Disseminating Lessons and Best Practices (continued)



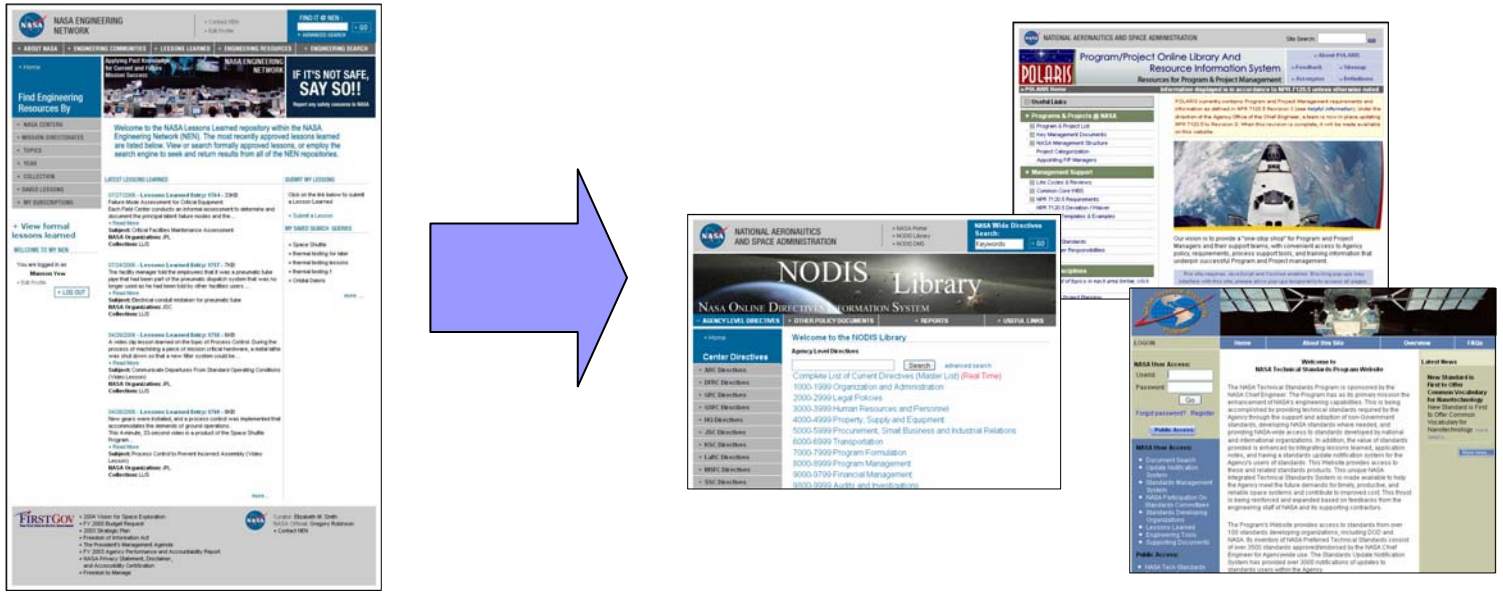
History of Lessons Learned



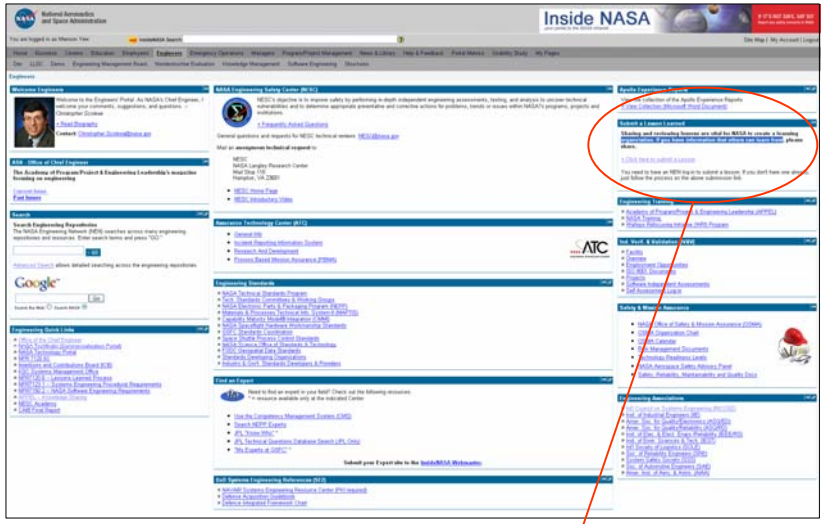
- In 1992, the paper-based Lessons Learned system developed
- Web-based system development began in 1994,
  - Prototype web-based system was rolled out in 1995
  - System went live agency wide in 1996
- In 2002, under the Freedom of Information Act, the public Lessons Learned web site was developed
- Next LLIS was developed (and active) in 1996 until November 2005
- LLIS in NASA Engineering Network (current)

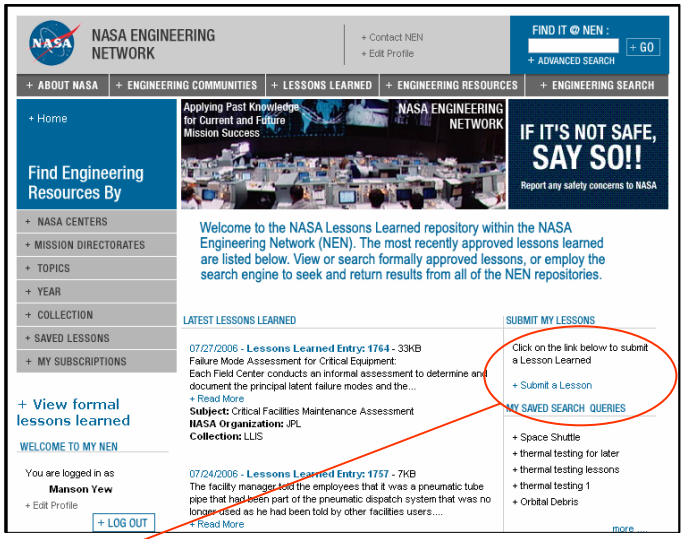
Lessons Learned (LL) Best Practice

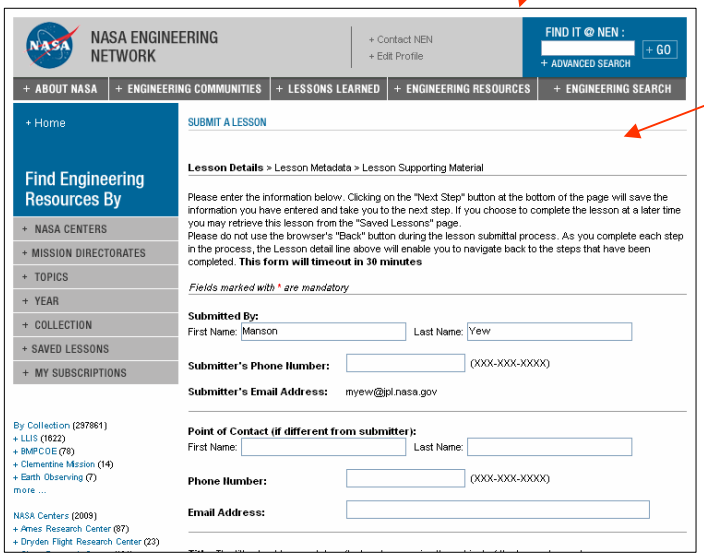
- Integrate lessons to policy, standards, and procedures
- Embed a “how to” capture process
  - Review LL at major milestones, technical reviews and other decision points
  - Determine lessons relevancy to project
  - Assess project compliance with LL recommendations



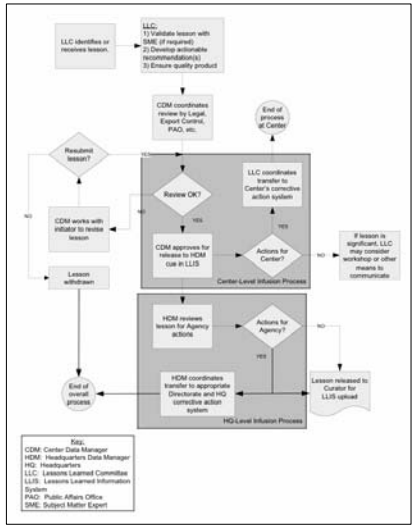
Capturing and Sharing Lessons





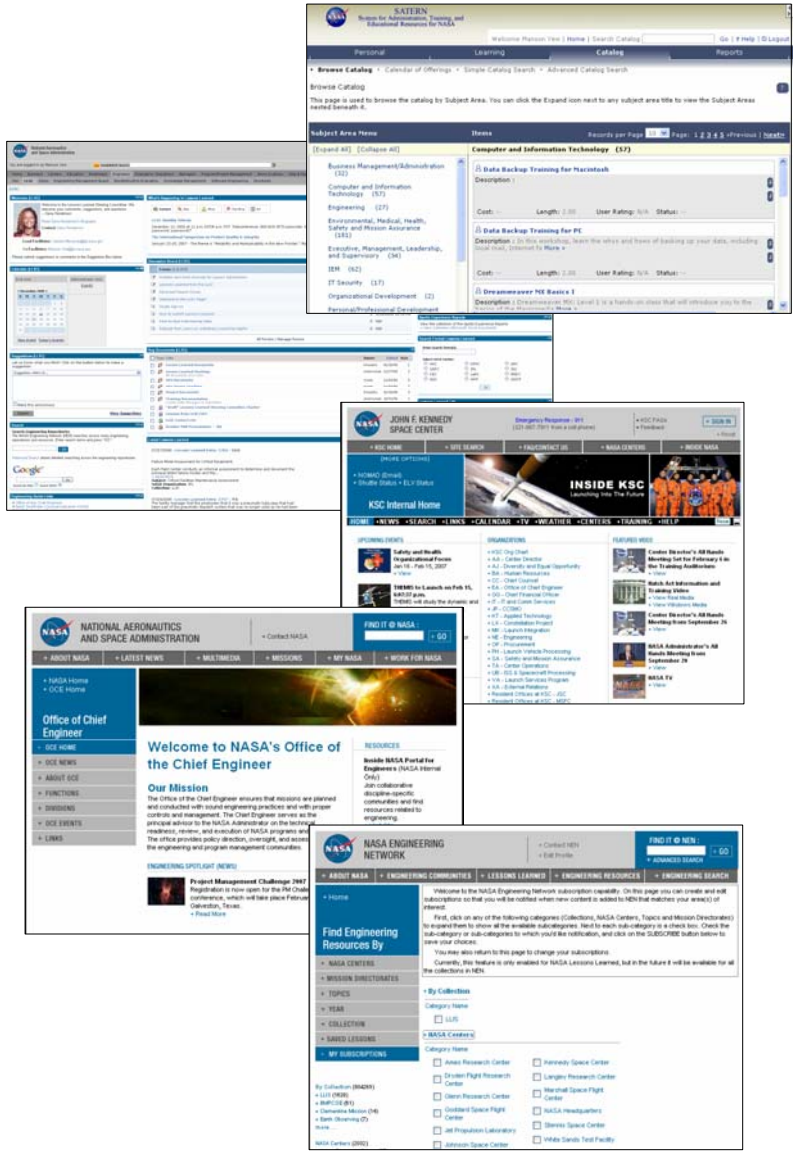


Multiple entries to the same submission form and workflow controlled lessons learned process

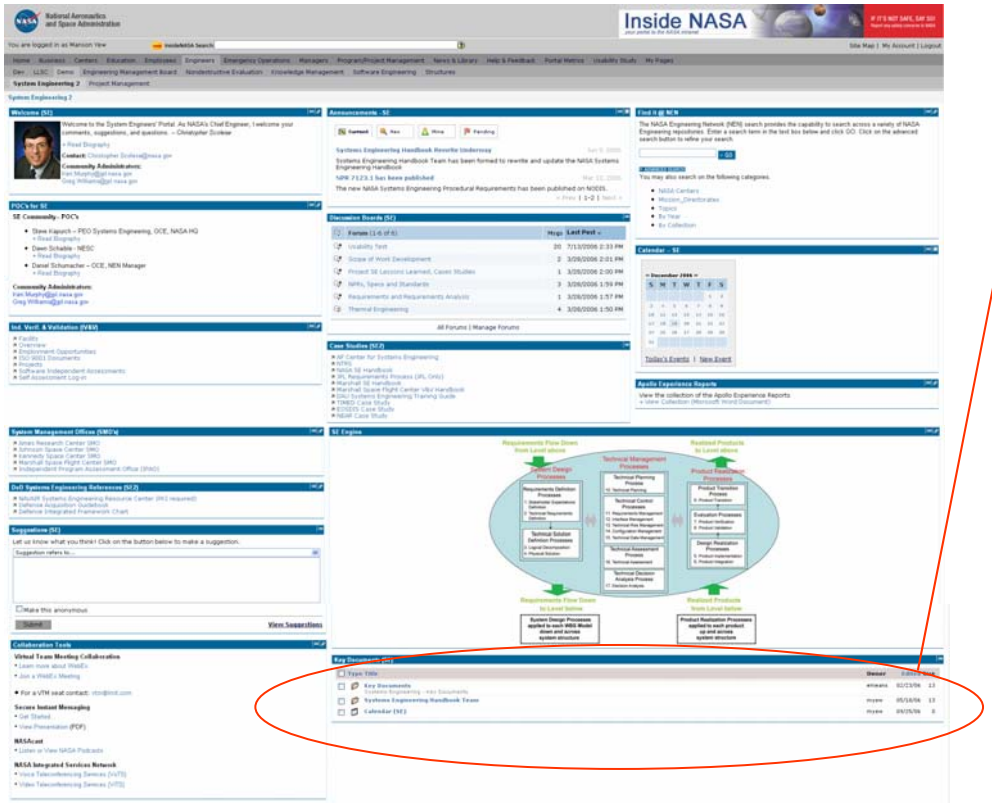


Disseminating Lessons and Best Practices

- Training
- Technical fellows
- Portal Discussion Forums
- Local Center level processes and workflows
- Center level newspapers and bulletins
- OCE Weekly notes
- NEN LL features (push)



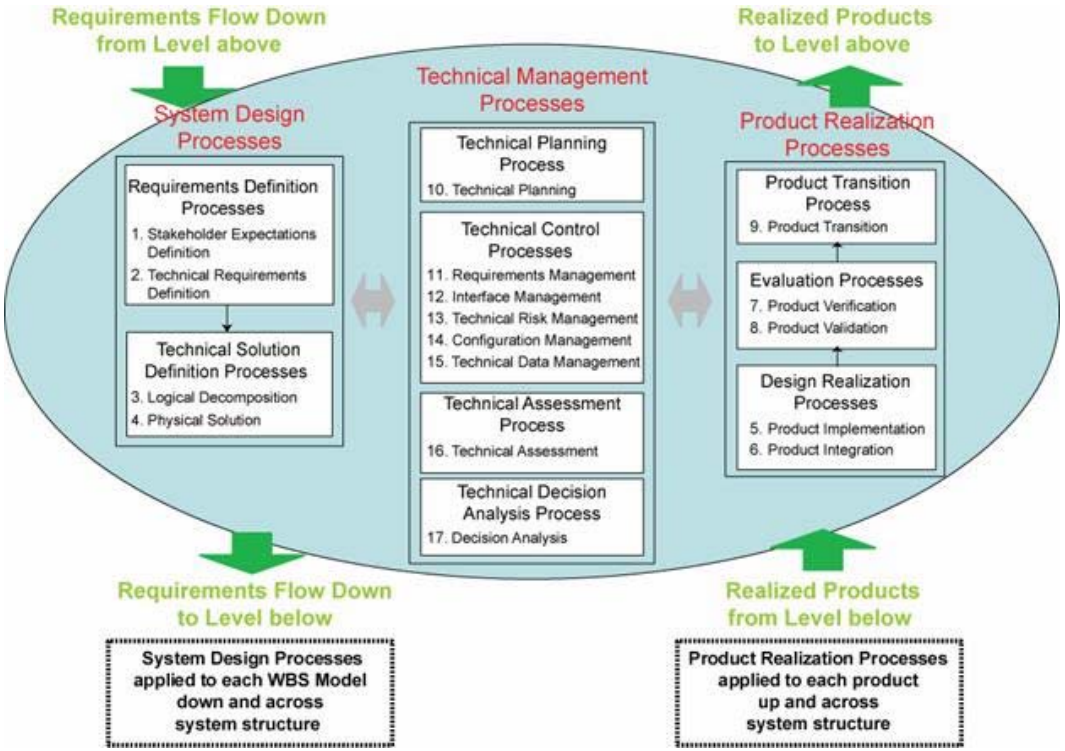
Policy Makers Embedding Lessons into Processes



NASA System Engineering Handbook rewrite team using NEN to collaborate among 60+ subject matter experts

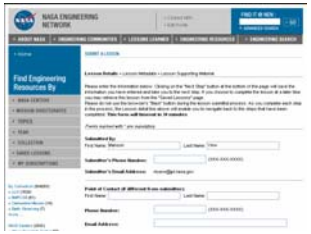
Spotlight on Systems Engineering

- Systems Engineering Handbook Update (SP 6105)
  - Systems Engineering Engine
    - Processes
      - New Special Topic: Lessons Learned and Knowledge Management



Focus on System Engineering Practitioners

- Main users
- Main contributors
  - Record LL as
    - Historical documents
    - Requirement rationales
    - Supporting data analyses
  - Demonstrate relevancy
    - Utilization
    - Management
    - Creation
    - Storage of lessons learned

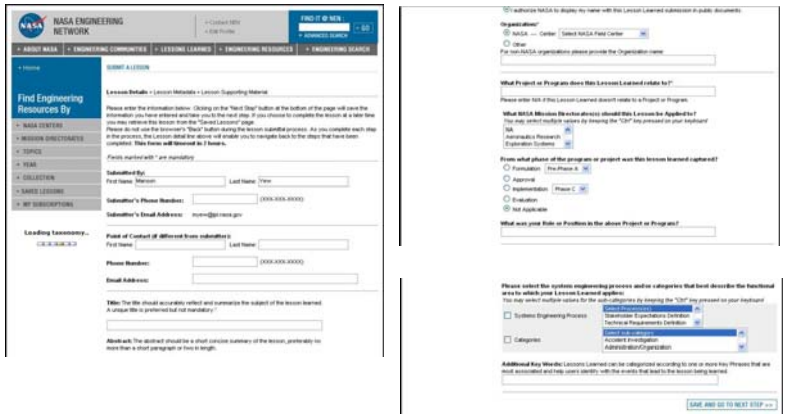


Applications of the LL Best Practice

- Utilization
  - Demonstrate hypotheses and conclusive insights from previous projects and processes
  - Determine previous lessons from processes or tasks that impact risks
- Management
  - Where to capture
    - Start of project
    - As it unfolds
    - End, hinders use of and evolution of
  - When to capture
    - Key decision points
    - End of life cycle phases (Phase control gate cues)
    - Technical reviews
  - How to overcome
    - Monthly lesson briefings
    - Periodic Agency sharing forums

Applications of the LL Best Practice (continued)

- Creation
  - Relevancy to mission success
  - Relevancy to project
  - Unique in the Agency
- Storage
  - Driving Events
  - Lessons Learned
  - Recommendations



For More Information

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